

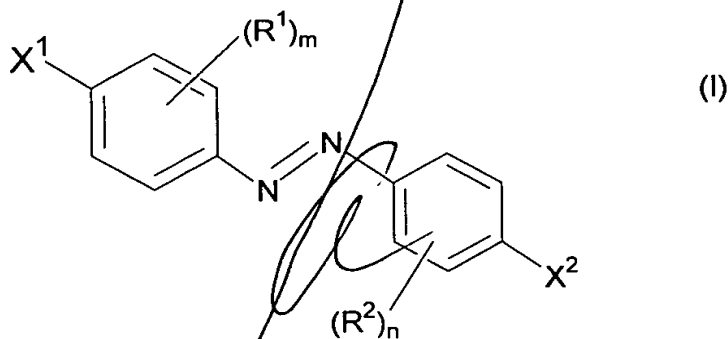
Patent Claims

- 5 1. Recording material for a holographic volume storage medium, containing at least one dye which changes its spatial arrangement when a hologram is recorded and, optionally, at least one shape-anisotropic grouping, characterised in that it permits the recording of several holograms at one specimen position.
- 10 2. Recording material according to claim 1, characterised in that the dye, of which there is at least one, changes its spatial arrangement in such a manner that it changes its absorption behaviour, in particular lowers its sensitivity to the actinic light, preferably reduces it by from 10 % to 100 %, more preferably from 50 % to 100 % and most preferably from 90 to 100 %, in each case based on the sensitivity prior to recording of the first hologram.
- 15 3. Recording material according to claim 1, characterised in that the dye, of which there is at least one, changes its spatial arrangement in such a manner that it changes its absorption behaviour, in particular lowers its sensitivity to the actinic light, especially in that it flips into the direction perpendicular to the polarising direction of the actinic light and its molecular longitudinal axis comes to lie at an angle with the polarising direction of the actinic light of from 10° to 90°, preferably from 50° to 90°, more preferably from 75° to 90° and most preferably from 85° to 90°.
- 20 4. Recording material according to one or more of claims 1 to 3, characterised in that it has an optical density  $\leq 2$ , preferably less than or equal to 1, more preferably less than or equal to 0.3, in a wavelength range of from 390 to 800 nm, preferably from 400 to 650 nm, more preferably from 510 to 570 nm and most preferably from 520 to 570 nm.
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5. Recording material according to one or more of claims 1 to 4, characterised in that it has an irradiated thickness of  $\geq 0.1$  mm, preferably  $> 0.5$  mm, more preferably  $> 1.0$  mm, most preferably not greater than 5 cm.
- 5 6. Recording material according to one or more of claims 1 to 5, characterised in that it contains predominantly polymeric or oligomeric organic material.
7. Recording material according to one or more of claims 1 to 6, characterised in that the optical density of the recording material is adjusted, preferably *via* the concentration of the dye, of which there is at least one.
- 10 8. Recording material according to one or more of claims 1 to 7, characterised in that the optical density is adjusted *via* the molar extinction coefficient of the dye, of which there is at least one.
- 15 9. Recording material according to one or more of claims 1 to 8, characterised in that it is polymeric or oligomeric organic, amorphous material, preferably side-chain polymers and/or block copolymers and/or graft polymers.
- 20 10. Recording material according to one or more of claims 1 to 9, characterised in that the electromagnetic radiation is light in the wavelength range of laser, preferably from 390 to 800 nm, more preferably from 400 to 650 nm, more preferably still from 510 to 570 nm, most preferably from 520 nm to 570 nm.
- 25 11. Use of the recording materials according to one or more of claims 1 to 10 for the recording, particularly the angle-dependent recording, of at least three, preferably more than 100, more preferably more than 500 and most preferably more than 1000 volume holograms, at one position of the storage material.
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12. Use of the recording materials according to one or more of claims 1 to 10 for the reading, particularly the angle-dependent reading, of volume holograms.
13. Holographic volume storage medium, characterised in that it contains a recording material according to claims 1 to 10.
14. Holographic volume storage medium according to claim 13, characterised in that the recording material contains one or more unsupported objects of any desired form, preferably an unsupported two-dimensional structure, more preferably an unsupported film, there being contained in a multilayer structure preferably at least one substrate layer.
15. Process for the preparation of the holographic volume storage medium according to at least one of claims 13 or 14, characterised in that it contains a step in which the operation is carried out according to a conventional injection-moulding process in the range up to 300°C, preferably up to 220°C, more preferably 180°C.
16. Polymers having chemically bonded dyes of formula (I)



wherein

R<sup>1</sup> and R<sup>2</sup> each independently of the other represents hydrogen or a non ionic substituent, and

R<sup>1</sup> may additionally represent -X<sup>1'</sup>-R<sup>3</sup>,

m and n each independently of the other represents an integer from 0 to 4, preferably from 0 to 2,

X<sup>1</sup> and X<sup>2</sup> represent -X<sup>1'</sup>-R<sup>3</sup> and X<sup>2'</sup>-R<sup>4</sup>, respectively, and

X<sup>1'</sup> and X<sup>2'</sup> represent a direct bond, -O-, -S-, -(N-R<sup>5</sup>)-, -C(R<sup>6</sup>R<sup>7</sup>)-, -(C=O)-, -(CO-O)-, -(CO-NR<sup>5</sup>)-, -(SO<sub>2</sub>)-, -(SO<sub>2</sub>-O)-, -(SO<sub>2</sub>-NR<sup>5</sup>)-, -(C=NR<sup>8</sup>)- or -(CNR<sup>8</sup>-NR<sup>5</sup>)-,

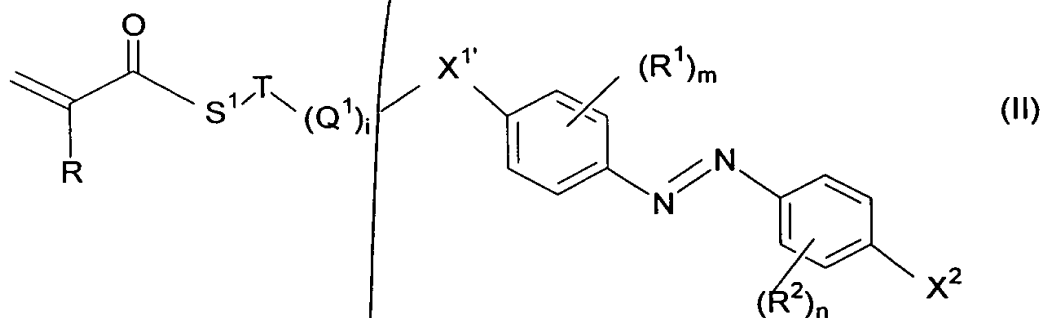
R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>8</sup> each independently of the others represents hydrogen, C<sub>1</sub>- to C<sub>20</sub>-alkyl, C<sub>3</sub>- to C<sub>10</sub>-cycloalkyl, C<sub>2</sub>- to C<sub>20</sub>-alkenyl, C<sub>6</sub>- to C<sub>10</sub>-aryl, C<sub>1</sub>- to C<sub>20</sub>-alkyl-(C=O)-, C<sub>3</sub>- to C<sub>10</sub>-cycloalkyl-(C=O)-, C<sub>2</sub>- to C<sub>20</sub>-alkenyl-(C=O)-, C<sub>6</sub>- to C<sub>10</sub>-aryl-(C=O)-, C<sub>1</sub>- to C<sub>20</sub>-alkyl-(SO<sub>2</sub>)-, C<sub>3</sub>- to C<sub>10</sub>-cycloalkyl-(SO<sub>2</sub>)-, C<sub>2</sub>- to C<sub>20</sub>-alkenyl-(SO<sub>2</sub>)- or C<sub>6</sub>- to C<sub>10</sub>-aryl-(SO<sub>2</sub>)-, or

X<sup>1'</sup>-R<sup>3</sup> and X<sup>2'</sup>-R<sup>4</sup> may represent hydrogen, halogen, cyano, nitro, CF<sub>3</sub> or CCl<sub>3</sub>,

R<sup>6</sup> and R<sup>7</sup> each independently of the other represents hydrogen, halogen, C<sub>1</sub>- to C<sub>20</sub>-alkyl, C<sub>1</sub>- to C<sub>20</sub>-alkoxy, C<sub>3</sub>- to C<sub>10</sub>-cycloalkyl, C<sub>2</sub>- to C<sub>20</sub>-alkenyl or C<sub>6</sub>- to C<sub>10</sub>-aryl.

17. Polymer according to claim 16, characterised in that it contains at least one monomer of formula (II)

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wherein

R represents hydrogen or methyl, and

the other radicals are as defined above.

18. Polymer according to at least one of claims 16 or 17, characterised in that it contains at least one monomer of formula (IIa) and/or (IIb).
19. Process for the preparation of the recording material according to one of claims 1 to 10 or of the polymers according to one of claims 16 to 18, characterised in that the monomer, of which there is at least one, is polymerised without further solvent, the polymerisation preferably being free-radical polymerisation and, more preferably, being initiated by free-radical initiators and/or UV light and/or thermally.

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